

### Evening sky in January 2025

To use the chart, hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge. As the earth turns the sky appears to rotate clockwise around the south celestial pole (SCP on the chart). Stars rise in the east and set in the west, just like the sun. The sky makes a small extra clockwise or westward rotation from night to night as we orbit the sun.

There are three 'evening stars': Venus low in the west, Jupiter in the north and Mars in the northeast. All are visible soon after sunset. Saturn appears near Venus as the sky darkens. Sirius, the brightest true star, appears high in the east at dusk. Below and left of it is Orion, containing 'The Pot'. The V-shaped face of Taurus is just above Jupiter. The Pleiades/Matariki star cluster is further down and left, toward the north. Canopus, the second brightest star after Sirius, is southeast of the zenith. Crux, the Southern Cross, and the Pointers are low in the south. From northern New Zealand the bright star Capella is near the north skyline.

## The Evening Sky in January 2025

Three bright planets make 'evening stars' in January. **Venus** is first to appear, low in the west. It is followed by **Jupiter** in the north, then **Mars** in the northeast. As the sky darkens **Saturn** appears near Venus, looking like a medium-brightness star. Venus sets around 11:40 at the beginning of the month and 11 at the end. Golden Jupiter is in the sky till morning hours and orange Mars is in the sky all night. Mars is at its closest for the year, 96 million km away, but small in a telescope. The Moon will be near Venus on the 3<sup>rd</sup>, between Venus and Saturn on the 4<sup>th</sup>, and near Mars on the 14<sup>th</sup>.

**Sirius**, the brightest true star, appears east of the zenith as the sky darkens. **Canopus**, the second-brightest star, is southeast of overhead. **Achernar**, fainter than Canopus, but one of the brightest southern stars, is southwest of overhead.

**Sirius** is called 'the Dog Star' because it marks the head of **Canis Major** the big dog. A group of stars to the right of Sirius make the dog's hindquarters and tail, upside down just now. Sirius is bright both because it is relatively close, nine light-years\* away, and 23 times brighter than the sun. **Procyon**, in the northeast below Sirius, marks Canis Minor, the smaller of the two dogs that follow Orion the hunter across the sky.

Left of Sirius, as the sky darkens, are **Rigel** and **Betelgeuse**, the brightest stars in Orion. **Rigel** is a bluish supergiant star, 70 000 times brighter than the sun and much hotter. It is 800 light-years away. Orange **Betelgeuse** is a red-giant star, cooler than the sun but hundreds of times bigger: a ball of extremely thin hot gas. It is around 400 light-years away. Between them, but fainter, is a line of three stars making Orion's belt. To southern hemisphere star watchers, Orion's belt makes the bottom of 'The Pot' or 'The Saucepan'. A faint line of stars above and right of the belt is the pot's handle or Orion's sword. It has a glowing cloud at its centre: the Orion Nebula.

Left of Orion, and just above Jupiter, is the V-shaped pattern of stars making the face of **Taurus** the Bull. The V-shaped group is called the Hyades cluster. It is 150 light-years away. Orange **Aldebaran**, making one eye of the bull, is not a member of the cluster but on the line of sight, at half the cluster's distance.

Left again, toward the north and lower, is the **Pleiades/Matariki/Seven Sisters/ Subaru** star cluster. Pretty to the eye and impressive in binoculars, it is 440 light-years from us. From northern Aotearoa the bright star **Capella** is on the north skyline. It is 90,000 times brighter than the sun and 3300 light-years away.

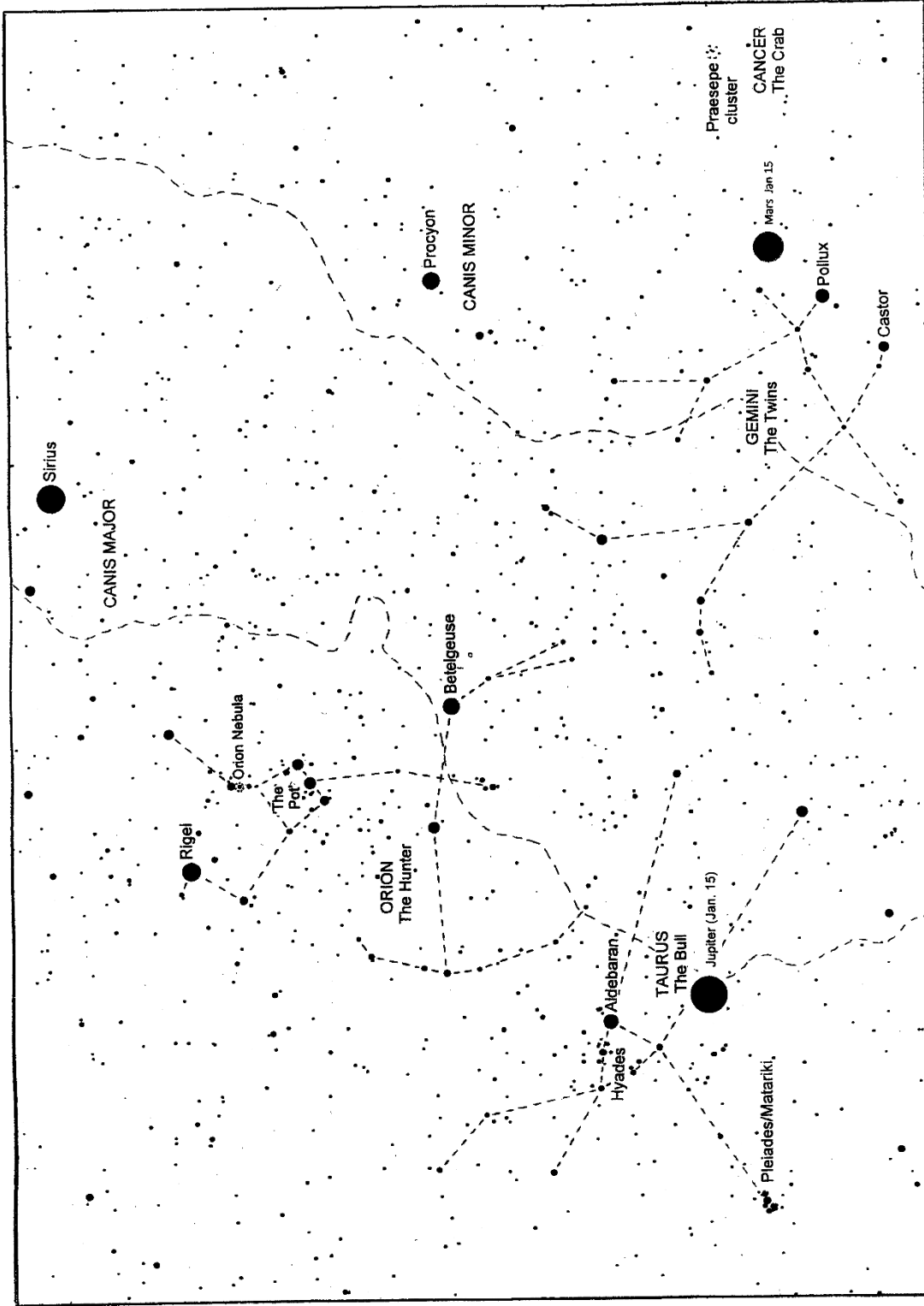
Low in the south are **Crux**, the Southern Cross, and Beta and **Alpha Centauri**, often called 'The Pointers'. Alpha Centauri is the closest naked-eye star, 4.3 light-years away. Beta Centauri, like most of the stars in Crux, is a blue-giant star hundreds of light years away. **Canopus** is also very luminous and distant: 13 000 times brighter than the sun and 300 light-years away.

The **Milky Way** is in the eastern sky, brightest in the southeast toward Crux. It can be traced towards the north but becomes faint below Orion. The Milky Way is our edgewise view of the Galaxy, the pancake of billions of stars of which the sun is just one. The Milky Way is faint right of Orion because we are looking toward its thin outer edge. The centre region of the Galaxy, in Sagittarius, is hidden by the sun at this time of year.

The Clouds of Magellan, **LMC** and **SMC** are high in the southern sky and easily seen by eye on a dark moonless night. They are two small galaxies about 160 000 and 200 000 light-years away.

Mercury is in the dawn sky. It rises ESE around 4:50 on January 1<sup>st</sup> and 5:30 by the 21<sup>st</sup>.

\*A **light year** is the distance that light travels in one year: nearly 10 million million km or  $10^{13}$  km. Sunlight takes eight minutes to get here; moonlight about one second. Sunlight reaches Neptune, the outermost major planet, in four hours. It takes sunlight four years to reach the nearest star, Alpha Centauri.



### Northeast Evening Sky in January 2025

Golden Jupiter is a beacon for the region, appearing in the north soon after sunset. Orange Mars appears soon afterwards, low in the northeast. Then Sirius, the brightest true star, midway up the northeast sky. Below and left of Sirius is the constellation of Orion with 'The Pot' at its centre. Above the Pot is Rigel, a bluish star. Below the Pot is Betelgeuse, an orange 'red giant' star. Above Jupiter is orange Aldebaran, making one eye of Taurus the Bull. Left of Jupiter is the Pleiades/Matariki/Seven Sisters star cluster.

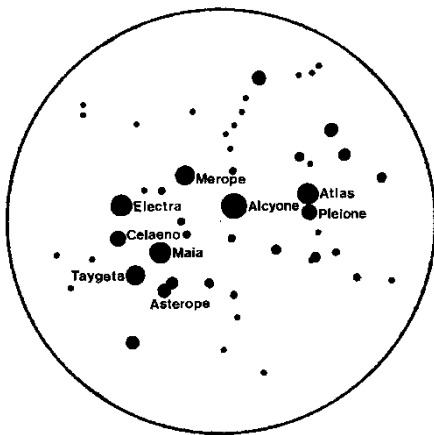
Chart produced by Guide 8 software, [www.projectpluto.com](http://www.projectpluto.com). Labels and text added by Alan Gilmore, Mt John Observatory of the University of Canterbury, P.O. Box 56, Lake Tekapo 7945, New Zealand. [www.canterbury.ac.nz](http://www.canterbury.ac.nz)

**Jupiter** appears in the north soon after sunset, shining with a steady golden light. Orange-red **Mars** appears soon after, low in the northeast. As the sky darkens, **Sirius** becomes visible midway up the northeast sky, often twinkling colourfully. There is an unreliable rule that stars twinkle and planets don't. It certainly works for Jupiter, and Mars when it is close, as now.

Below and left of Sirius is the constellation of **Orion** with its bright stars, bluish-white **Rigel** and orange **Betelgeuse**. Between them is the line of three fainter stars making Orion's belt or, in the southern hemisphere view, the bottom of **The Pot** or Saucepan. Above Jupiter is orange **Aldebaran**, one eye of Taurus the Bull. The bull's face is made by the V-shaped cluster of stars called the **Hyades**, upside down in our view. Left of Jupiter is the **Pleiades/ Matariki** star cluster.

Mars is closest to us in mid-January but still 96 million km away, so small in a telescope. A magnification of 125x is needed to make it look as big as the full moon does to the naked eye. As it is low in the sky we are looking through a lot of air that blurs the telescopic view. Jupiter is a good target for any telescope. Its big moons are easily seen, though not always all four at the same time as they pass in front of and behind Jupiter and into its shadow.

**Orion**, in the northern hemisphere view, has a shield raised toward Taurus and a club ready for action. The line of faint stars above and left of the belt then form Orion's sword dangling from his belt. In the southern hemisphere it makes the handle of The Pot. A modern variation on this is 'the shopping trolley'. The Pot is the trolley's basket. Betelgeuse and Bellatrix, the star above and left of Betelgeuse, make the wheels. Like most constellation pictures, it requires imagination.



The **Pleiades / Seven Sisters / Matariki / Subaru**, and many other names, is a cluster of stars well known in both hemispheres. Though often called the Seven Sisters, most modern eyes see only six stars. Dozens are visible in binoculars. The cluster is 440 light years away. Its brightest stars are around 200 times brighter than the sun.

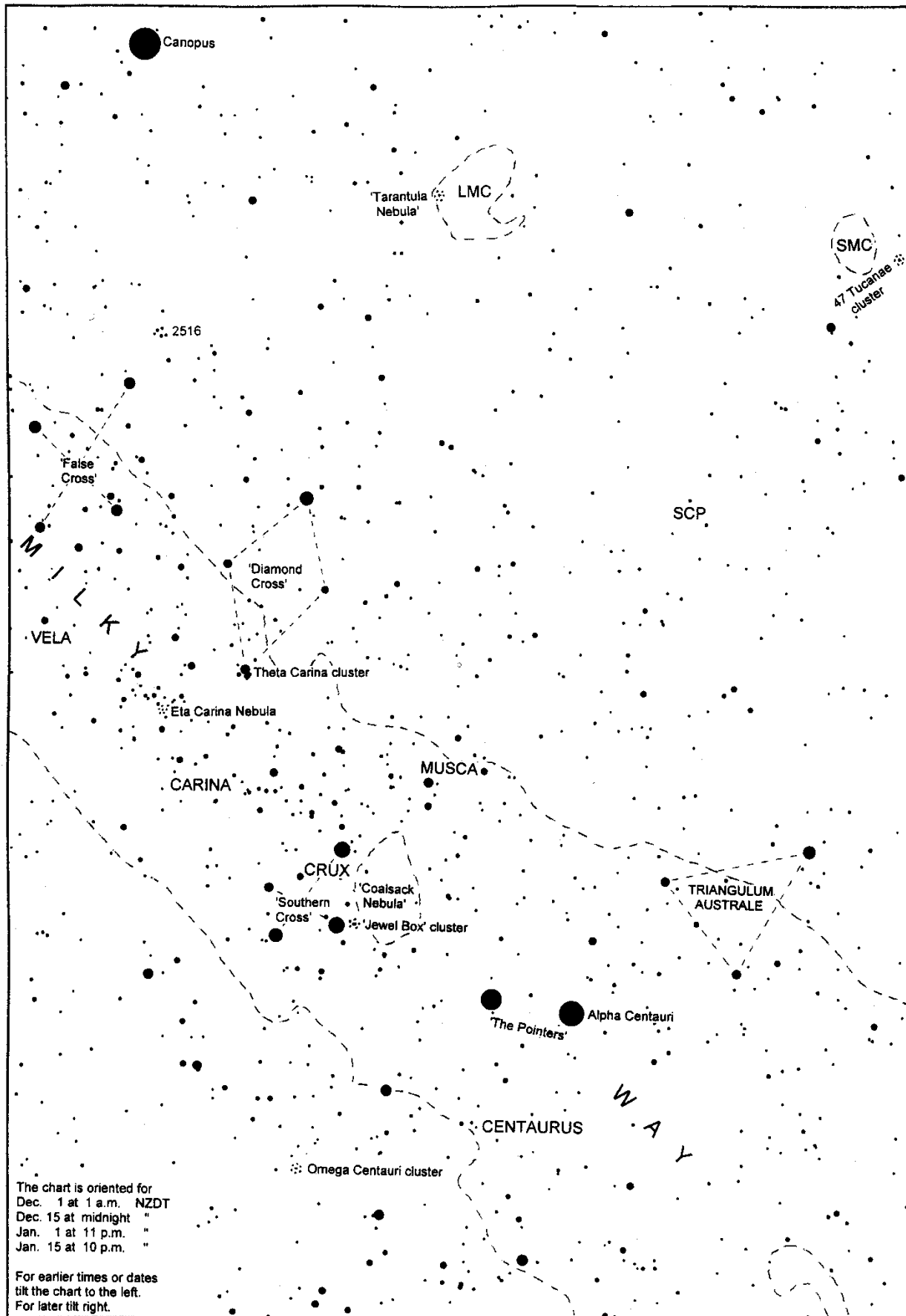
One **light-year (l.y.)** is the distance light travels in one year: about 10 million million km or 6 million million miles. Light from the sun reaches us in 8 minutes; from the moon in 1 second. Sunlight takes 4 hours to reach Neptune, the outermost significant planet, and 4 years to reach Alpha Centauri, the nearest star.

The **Hyades** cluster is 160 light- years away. Its brightest stars (not Aldebaran!) are about 70 times brighter than the sun. The cluster is 630 million years old. **Aldebaran** is not a member of the cluster but simply on the line of sight. It is 65 l.y. away and 150 times brighter than the sun. Its orange colour is due to its temperature, around 3500° C. The sun is 5500° C.



The **Orion Nebula** is visible in binoculars as a misty glow around the middle stars of Orion's sword or the handle of The Pot. It is a vast cloud of dust and gas about 1300 l.y. away and more than 20 l.y. across. Ultra-violet light from massive, extremely hot stars in the cloud causes it to glow. Some stars in this region are only two million years old. The sun, by contrast, is 4.6 billion years old. Stars continue to form in a giant cloud behind the glowing nebula. There are many bright and dark nebulae in this region. The Horsehead nebula, a favourite of astronomy books, is beside the right-hand star of Orion's Belt, but too faint to see in small telescopes.

**Sirius** is the brightest star, though the planets Venus and Jupiter, and sometimes Mars, are brighter. Sirius appears bright because it is both 30 times brighter than the sun and relatively close at 8.6 l.y. away. Sirius was often called 'the dog star' being the brightest star in Canis Major, one of the two dogs that follow Orion across the sky.



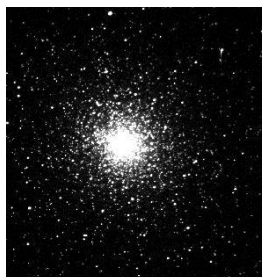
### Southern Evening Sky in January

The chart shows the lower southern sky. Interesting star clusters and nebulae are indicated with asterisks. They are described on the other side of this page.

Chart produced by Guide 8 software; [www.projectpluto.com](http://www.projectpluto.com). Labels and text added by Alan Gilmore,  
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## Interesting Objects in the Southern Sky

**Large & Small Clouds of Magellan (LMC & SMC)** appear as two luminous patches, easily seen by eye in a dark sky. They are two galaxies like the Milky Way but much smaller. Each is made of billions of stars. The Large Cloud contains many clusters of young luminous stars seen as patches of light in binoculars and telescopes. The LMC is about 160 000 light years away and the SMC 200 000 l.y away, both very close by for galaxies. (1 light year is about 10 000 billion km,  $10^{13}$  km.)



**47 Tucanae**, looks like a faint fuzzy star on the edge of the SMC. It is a globular cluster, a ball of millions of stars. A telescope is needed to see a peppering of stars around the edge of the cluster. Though it appears on the edge of the SMC it is much closer, 13 000 light years away, and it has no connection to the Small Cloud. Globular clusters are mostly very old, 10 billion years or more; at least twice the age of the sun. **Omega Centauri**, very low in the south, is a similar cluster.



**Tarantula nebula** is a glowing gas cloud in the LMC. The gas glows in the ultra-violet light from a cluster of very hot stars at centre of the nebula. The cloud is about 800 light years across. It is easily seen in binoculars and can be seen by eye on moonless nights.

This nebula is one of the brightest known. If it was as close as the Orion nebula (in The Pot's handle) then it would be as bright as the full moon.

**Canopus** is the second brightest star. It is 14 000 times brighter than the sun and 300 light years away. Sirius, high in the east, is the brightest star in the sky.

**Alpha Centauri**, the brighter Pointer, is the closest naked-eye star, 4.3 light-years away. Alpha Centauri is a binary star: two stars about the same size as the sun orbiting around each other in 80 years. A telescope that magnifies 50x splits the pair. (A very faint and slightly closer star, Proxima Centauri, orbits a quarter of a light-year, or 15 000 Sun-earth distances, from the Alpha pair.)

**Coalsack nebula** is a cloud of dust and gas about 600 light years away, dimming the more distant stars in the Milky Way. Many similar 'dark nebulae' can be seen, appearing as slots and holes in the Milky Way. These clouds of dust and gas eventually coalesce into clusters of stars.

**The Jewel Box** is a compact cluster of young luminous stars about 7000 light years away. The cluster formed about 16 million years ago. To the eye it looks like a faint star.



**Eta Carinae nebula** is a glowing gas cloud about 8000 light years away. The golden star in the cloud, visible in binoculars, is Eta Carinae. (Eta is the Greek 'e'.) It is a binary star: two massive stars orbiting each other in 5.5 years. The bigger star is 80 times heavier than the Sun; the smaller is 60 times the Sun's mass. Together they are about five million times brighter than the Sun but are dimmed by dust clouds around them. The bigger star is expected to explode as a supernova any time in the next few thousand years.

Many star clusters are found in this part of the sky.

The **Theta Carina Cluster** at one point of the 'Diamond Cross'. It is also known as the 'Five of Diamonds' cluster, the reason obvious when it is seen in a telescope. A newish name is 'Southern Pleiades', though this cluster appears much fainter and smaller than the real Pleiades in Taurus. The cluster is about 500 light years away and is around 30 million years old.

**NGC 2516**, above the Diamond Cross, looks like a faint comet without a tail. It is a star cluster nicely seen in binoculars. It is 1200 light years away.